



State of Alaska
Governor's Task Force on Broadband
Report and Recommendations
November 1, 2021

Prepared by



www.connectednation.org

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I. Letter from the Chair

II. Introduction

Improving quality of life, reducing costs, and facilitating fair and competitive markets are key goals in developing and advancing Alaska’s economy and making Alaska a great place to raise families and operate businesses. Deploying and operating broadband networks that can deliver high speed, reliable, and affordable communications services to Alaska’s residents and businesses is an integral part of that effort.

In August 2014, Alaska’s first broadband task force highlighted the critical needs and demands for broadband connectivity, as well as some of the challenges to deploying networks in Alaska. Those included difficulties in building and maintaining network facilities in Alaska’s geography and climate, the need to obtain State authorization in a timely manner, environmental permits and utilization of rights of way, and the challenging economics of constructing and operating networks in rural and remote areas of the state. The task force’s report was refreshed by the Denali Commission, with support from nonprofit Connected Nation, in December 2019.

The COVID-19 pandemic has emphasized the urgent need for reliable, high-speed connectivity for all Alaskans. Closing Alaska’s digital divide is now more important than ever to meet an exponentially growing demand for bandwidth to support basic government and domestic functions including commerce, healthcare, education, economic development, innovation, and addressing quality of life issues for Alaskans.

On May 6, 2021, Governor Mike Dunleavy issued Administrative Order No. 322,¹ which created Alaska’s second task force on broadband. Task force members were subsequently appointed by the governor on June 25, and the task force convened for the first time on July 19. At the first meeting, the task force divided itself into two working subgroups—one focused on the state’s technical issues related to broadband infrastructure deployment, and one focused on public policies needed to support a robust statewide broadband ecosystem. Governor Dunleavy charged the task force and its subgroups to review and provide recommendations regarding broadband goals and policies, guidelines for state involvement in broadband infrastructure development, and equitable use of state funds to assist in the buildout of broadband networks.

Governor Dunleavy assigned the completion of seven tasks to the task force:

1. **Needs Assessment & Gaps:** Identify and complete a needs assessment of the “gaps” in the current broadband network deployment. Identify communities most in need of upgraded or new infrastructure.
2. **Buildout Plan:** Provide recommendations for a buildout plan to close remaining gaps and bring high-speed broadband to all Alaskans.

¹ See <https://gov.alaska.gov/wp-content/uploads/sites/2/07.19.2021-AO-322.pdf>

3. **Evaluation of Broadband Technologies:** Evaluate all technologies that are used to provision broadband, identify and assess the pros and cons of each as they pertain to connecting all Alaskans with high-speed connectivity.
4. **Hurdles to Investment & Deployment:** Assess the hurdles to broadband investment and deployment. Make recommendations on how the state can play a role to eliminate them.
5. **Broadband Office:** Provide recommendations for a state repository of broadband information and expertise that does not increase the state budget.
6. **State Participation:** Identify and lay out recommendations of policies and guidelines for state participation in broadband infrastructure development and ongoing operations.
7. **Funding Prioritization:** Recommend program-based guidelines or rules for equitable use of state funding in broadband infrastructure development.

The task force's findings and recommendations are compiled in this report, organized by chapters associated with each of the seven assigned tasks.

The task force consists of 12 voting members. They are:

- **Hallie Bissett**, Chair, representative of Alaska Natives
- **Steve Noonkesser**, Vice Chair, Southwest Region School District, a representative of a rural Alaska school district
- **Julie Anderson**, Commissioner of the Department of Commerce, Community and Economic Development
- **Nils Andreassen**, representative of the Alaska Municipal League
- **Kati Capozzi**, Alaska Chamber of Commerce, representative of a statewide organization representing business communities throughout Alaska
- **Stewart Ferguson**, Alaska Native Tribal Health Consortium, a representative of rural healthcare interests
- **Gerad Godfrey**, a representative of the general public
- **John Handeland**, Nome, the mayor of a community off the road system
- **Michael Johnson**, Commissioner of the Department of Education and Early Development
- **Christine O'Connor**, representative of the telecommunications industry
- **Allen Todd**, representative of regional rural interests
- **Bryce Ward**, Fairbanks - North Star Borough, the mayor of a community on the road system

In addition, the following ex-officio members were appointed by the Alaska House of Representatives and Senate:

- **State Rep. Grier Hopkins**, Fairbanks
- **State Sen. Shelley Hughes**, Palmer

III. Tasks Assigned by the Governor

The seven tasks assigned to the task force are as follows. Each task represents a separate chapter in this report.

1. **Needs Assessment & Gaps:** Identify and complete a needs assessment of the “gaps” in the current broadband network deployment. Identify communities most in need of upgraded or new infrastructure.
2. **Buildout Plan:** Provide recommendations for a buildout plan to close remaining gaps and bring high-speed broadband to all Alaskans.
3. **Evaluation of Broadband Technologies:** Evaluate all technologies that are used to provision broadband, identify and assess the pros and cons of each as they pertain to connecting all Alaskans with high-speed connectivity.
4. **Hurdles to Investment & Deployment:** Assess the hurdles to broadband investment and deployment. Make recommendations on how the state can play a role to eliminate them.
5. **Broadband Office:** Provide recommendations for a state repository of broadband information and expertise that does not increase the state budget.
6. **State Participation:** Identify and lay out recommendations of policies and guidelines for state participation in broadband infrastructure development and ongoing operations.
7. **Funding Prioritization:** Recommend program-based guidelines or rules for equitable use of state funding in broadband infrastructure development.

1. Needs Assessment & Gaps

Task: Identify and complete a needs assessment of the “gaps” in the current broadband network deployment. Identify communities most in need of upgraded or new infrastructure.

Of all U.S. states, Alaska is, by almost any measure, the most challenging state to ensure the ubiquitous delivery of high-quality broadband connectivity. This is true both in the assessment of broadband needs and the closure of coverage gaps once those needs are identified. Because of Alaska’s status as the largest U.S. state by area—comprising more area than the next three largest states (Texas, California, and Montana) combined—the challenge of extending robust broadband infrastructure to every community is substantial indeed.

Geographically, vast distances separate communities in Alaska, with much of the land in between them being controlled by the USDA Forest Service, the Department of the Interior’s Bureau of Land Management, the U.S. Department of Defense, and state entities that include the Alaska Department of Transportation, the Alaska Department of Natural Resources, and the Alaska Railroad Corporation.

Such significant government ownership and control yields a complex compliance environment that can challenge service providers in obtaining the proper permits necessary for construction. The hardest-to-serve communities are located “off the road system,” meaning that they are only accessible by boat or aircraft, with no roads in or out. Mountainous terrain, harsh winter weather, permafrost in many areas, a very short construction season, and limited-to-no daylight hours in winter months represent significant additional hurdles to overcome, not just for the deployment of broadband infrastructure, but for its ongoing maintenance and operations as well.

Beyond that, Alaska’s status as the third least-populous U.S. state means that telecommunication companies face extreme economic hurdles in justifying the expenditure of private capital alone on broadband infrastructure to many areas. Alaska’s extremely low population and household density outside the larger cities of Anchorage, Fairbanks, and Juneau translates to environment in which there may be no viable means of cost recovery without significant government support. Additionally, business customers that elsewhere serve as anchor customers to broadband service providers (thereby improving the overall economics of deployment) are either extremely limited in number or nonexistent in communities off the road system.

While all of these factors make broadband extremely challenging to deploy, it is also true that robust broadband infrastructure is needed more so in Alaska than perhaps any other state. The same geographic and economic factors that make broadband difficult to deploy are the same factors that inhibit the effective delivery of healthcare, government, and education services—services that can be efficiently delivered over

broadband. So, while the cost to deploy may be high, the cost of inaction is likely even higher.

In the exploration of data to define the extent of Alaska's broadband needs, the task force determined that complete data on broadband infrastructure and services is not available at this time. The State of Alaska does not currently maintain a map of last-mile service availability. The Federal Communications Commission (FCC) and National Telecommunications and Information Administration (NTIA) compile and maintain maps of broadband service availability, but they are not comprehensive and are widely criticized as flawed and unreliable.

Collected via what is known as "Form 477," the FCC receives and analyzes service availability data by census block as reported by broadband service providers semi-annually. If one household in a given census block is served, then a service provider will report to the FCC that the entire census block is served. This is a problematic means of measuring service availability, particularly in sparsely populated states, given that census blocks may range in size from 0.1 square mile in urban areas to more than 5,000 square miles in rural areas. Of course, the largest census blocks in the country are in Alaska, and that means service availability is likely the most overstated and unreliable here.

According to the FCC's 14th Broadband Deployment Report,² issued January 19, 2021, 85.2% of Alaskans now have access to fixed terrestrial broadband at speeds of at least 25 Mbps downstream and 3 Mbps upstream—an increase of 3.39 percentage points since 2019. However, according to the same report, only 63.7% of Alaskans living in rural areas have such access. Given the inherent overstatement of coverage for the reasons described above, the state's actual coverage is likely even less extensive.

Fortunately, the FCC is in the process of implementing the Broadband DATA Act (Public Law No. 116-30),³ passed by the 116th Congress and signed into law in March 2020, creating what the FCC calls its "Broadband Data Collection (BDC)" program. The law requires the FCC to create a new national broadband map that depicts service availability on a location-specific, structure-by-structure basis across the entire United States—a vast improvement over the current Form 477 reporting regime. Still, it is estimated that the new map will not be available to guide policymaking or direct the investment of state or federal funds toward broadband buildout until late 2022 or early 2023.

Beyond the lack of reliable service availability data, the state of broadband network construction is also quite fluid due to recent infusions of federal funding made available by Congress through programs like USDA's ReConnect and Community Connect

² See <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>

³ See <https://www.congress.gov/bill/116th-congress/senate-bill/1822/text>

Programs, NTIA's Tribal Broadband Grant Program, the U.S. Treasury's American Rescue Plan Act (ARPA) funding programs, and others. The FCC's BDC program will track these and other future broadband investments as network infrastructure is built out, but real-time information on buildout progress is not currently available for the task force to assess.

Given the information above, and as part of its work to define the state's needs and coverage gaps, the task force identified five (5) important elements which constitute a "gap" in the state's broadband landscape. Those are:

- A. End-user broadband service level (speed/capacity)
- B. Middle-mile availability (speed/capacity)
- C. Affordability
- D. Workforce development
- E. Evolving capability

These five elements, and associated recommendations, are described in further detail below.

A. End-user Broadband Service Level (speed/capacity)

In order to determine what level of broadband service should be available to end-user homes and small businesses across Alaska (i.e., "last-mile" service), the task force established that such service must, at a minimum, be capable of supporting the most critical functions that end-users need at their location for the delivery of remote health care, education, and participation in commerce.

The task force determined that quality of service (QoS) for end-user connectivity should be assessed using three criteria:

- **Speed** (alternatively called throughput capacity) is defined as the rate at which data can be transmitted to or from an end-user (download/upload); end-user broadband speeds today are typically measured in megabits per second (Mbps) or gigabits per second (Gbps)
- **Latency** refers to the amount of time required for a data packet to travel to its destination and back; the measurement of latency quantifies the delay that an end-user experiences between initiating an action and seeing a result; latency is typically measured in milliseconds (ms)
- **Data Usage Allowance** refers to the amount of data, usually measured in megabytes (MB) or gigabytes (GB), that an end-user is allowed to transmit or receive over a given period of time (usually monthly)

The task force also determined that service levels in rural Alaska should be comparable to those in urban Alaska, and that policymakers should focus on the quality of service delivered—NOT on the broadband technology used to deliver it.

RECOMMENDATION #1
<p>The following benchmarks should be used to determine if a community has a gap in end-user/last-mile broadband infrastructure:</p> <ul style="list-style-type: none">1) Unserved Area: an area that does not have access to broadband speeds of at least 25 Mbps (downstream) and 3 Mbps (upstream)2) Underserved Area: an area that does not have access to broadband speeds of at least 100 Mbps (downstream) and 20 Mbps (upstream)3) Latency: must be sufficient for real-time applications such as telemedicine and distance education (approximately 100ms)4) Data Usage Allowance: must be comparable to broadband packages offered in urban Alaska markets (Anchorage/Fairbanks)

B. Middle-Mile Infrastructure (speed/capacity)

- 1. Middle-mile connectivity, which sometimes may be called “transport” or “backhaul,” is defined as high-capacity network infrastructure (generally, but not always, fiber optic cable) that links a network operator's core network to its last-mile distribution network. All middle mile infrastructure in Alaska must connect to peering points in the Lower 48 to be functional. It is therefore critical to have robust middle-mile connections both within Alaska and connecting Alaska to the Lower 48.

Examples in Alaska include Matanuska Telephone Association’s terrestrial fiber which connects Alaska to the Lower 48 via Canada and KPU Telecom’s undersea fiber which connects Ketchikan to the Lower ’48 through Canada. Other examples include Alaska Power & Telephone’s microwave network in southeast Alaska and GCI’s TERRA microwave network in southwest Alaska, as well as satellite networks that connect remote Alaska villages to an earth station in Seward and the terrestrial fiber network operators that backhaul traffic from there.

The task force determined that the state’s middle-mile infrastructure must be capable of supporting end-user and last-mile services required in a community. Insufficient middle-mile capacity will ultimately result in degraded last-mile capacity, and thus, poor end-user experiences online, inhibiting commerce and the delivery of healthcare, education, and government services.

RECOMMENDATION #2

Future broadband policy and program analyses should include data-gathering and research to identify where additional middle-mile capacity is needed in order to meet established last-mile service availability speed targets, recognizing that any established standards will need to evolve with the growing demands of technology and consumer use over time.

2. The task force also determined that a statewide fiber optic backbone is needed, as many communities off the road system are currently backhauled via microwave or satellite. Such an investment would provide scalable middle-mile capacity and significantly lower latency to those communities, allowing for the evolution of services to rural Alaska and making such services more resilient and reliable.

RECOMMENDATION #3

Future broadband policy analyses should include additional data-gathering and research to identify backbone routes and hub locations from which fiber optic backbone infrastructure should be extended in order to support higher capacity, more resilient services to more remote locations.

3. In the wake of the COVID-19 pandemic, Congress has appropriated an unprecedented amount of funding to support broadband infrastructure buildout in 2021. H.R. 1319, the *American Rescue Plan Act* (ARPA), was signed into law on March 11 and made last-mile broadband infrastructure one of many eligible expenses under the U.S. Treasury’s “Coronavirus State and Local Fiscal Recovery Funds”—a combined \$350 billion program that allocated money to state and local governments throughout the U.S. for the purpose of pandemic recovery.

ARPA also established the Coronavirus Capital Projects Fund (CCPF)—a separate \$10 billion program that is focused on broadband connectivity but also may be spent on other infrastructure projects that allow Alaskans to find work, increase their education levels, and monitor their health. Alaska’s CC PF allocation is \$111,803,893, and the state has until September 24, 2022 to identify qualifying projects and seek Treasury’s approval for them.

Beyond those programs, the bipartisan federal infrastructure bill known as the Infrastructure Investment and Jobs Act (H.R. 3684) is expected to be signed into law in late 2021. It contains an additional \$65 billion for broadband infrastructure and related programming, including \$42.5 billion for last-mile and \$1 billion for middle-mile construction.

These programs represent a generational infusion of resources to deploy broadband infrastructure across the United States. Alaska’s needs are arguably more significant than in any other state, and given the level of resources now available, the task force believes the threshold of where it is possible to deploy robust terrestrial broadband networks has changed, making it possible to build terrestrial middle and last-mile capacity to places never before considered as feasible.

RECOMMENDATION #4
Robust broadband services should be available to all Alaskans; policymakers should not limit long-term buildout objectives by relying on previous conceptions of where it is and isn’t possible to deploy terrestrial infrastructure.

4. The task force also recognizes that broadband infrastructure gaps—both middle-mile and last-mile—exist in less remote areas of Alaska. Even areas that have immediate physical access to urban centers may not have robust broadband infrastructure. Although reliable mapping is not currently available to pinpoint infrastructure gaps, anecdotal experience among the task force members suggests that the line between relatively well-served, urban Alaska and unserved or underserved Alaska may not be far outside urban centers.

RECOMMENDATION #5
<p>Accurate, granular broadband availability and infrastructure maps should define where unserved and underserved areas exist due to gaps in broadband infrastructure, regardless of whether those areas have physical proximity to urban centers. Future work analyzing broadband policy should include additional data-gathering and research to identify ALL unserved and underserved areas.</p>

C. Affordability

As discussed previously in this chapter, Alaska’s geographic size, terrain, and climate, along with the physical isolation of many communities across the state, contribute to an operational environment that creates extremely high costs, not only to deploy broadband infrastructure, but to operate and maintain it as well. Those high costs are generally passed along to end users in the form of higher monthly service bills and surcharges for data usage beyond monthly plan allowances. While empirical data on monthly service costs is not available statewide, anecdotal costs derived from service provider marketing materials show that Alaskans generally pay higher costs for service than do subscribers in the Lower 48, with communities off the road system generally paying significantly higher rates and experiencing data consumption limitations.

The task force has identified that affordability, not just physical access to deployed infrastructure, is an important consideration in determining where broadband gaps exist. In some cases, broadband infrastructure may be deployed, but because of the heavy level of private investment required, the cost of the resulting service may remain largely unaffordable to the average home in a community. Fortunately, increased support from new federal programs may make it possible for services to be deployed at rates similar to those offered in urban areas.

RECOMMENDATION #6

Policymakers should recognize that affordability is an important element in defining where gaps in broadband infrastructure exist. Policymakers should also recognize that affordability is driven by underlying costs associated with Alaska’s unique operational environment, and that partnerships between service providers and state/federal programs are important in achieving affordable service delivery to end-users.

D. Workforce Development

The ability to deploy, operate, maintain, and repair broadband infrastructure depends on having a skilled workforce in place, and the ongoing development and support of that workforce locally. In a letter written to President Biden on January 27, 2021,⁴ 11 telecommunications industry trade associations highlighted a serious concern: that America doesn’t currently have the necessary workforce to support the needed expansion and operations of new broadband infrastructure. The trade associations stated their concerns clearly:

“The U.S. currently faces a shortfall of skilled workers needed to deploy broadband across the country, to win the race to 5G, and to ensure robust fiber, mobile, and fixed wireless networks. Needed investments in broadband infrastructure will increase demand on a labor force already in short supply. To improve the efficiency of federal funding, a corresponding initiative is needed to develop a workforce properly trained with the skills to deploy next generation wired and wireless networks.”

Alaska is certainly not immune to these challenges, as attracting and maintaining a skilled workforce, particularly in the field of telecommunications, is a difficult obstacle to overcome. Yet it is an incredibly important problem to solve. A local workforce reduces service disruptions and increases the quality of the service provided, particularly in a state like Alaska where extreme weather and distance can challenge maintenance and operations.

⁴ See https://wia.org/wp-content/uploads/workforce-letter-jan-2021_biden_final.pdf

The task force wishes to emphasize that workforce development is an important and necessary element to consider in future broadband deployment projects.

RECOMMENDATION #7

Additional priority should be given to broadband infrastructure projects that include support for local workforce development.

E. Evolving Capability

1. First quantified in 1998 by researcher Dr. Jakob Nielsen, Nielsen's Law of Internet Bandwidth⁵ has been used by the broadband service provider industry to plan broadband network growth needs. The law states that a high-end user's connection speed will need to grow by 50% each year, doubling every 21 months. Since Nielsen first published his model, the law has largely held true, showing exponential growth from 1982 to 2019 that is consistent with Nielsen's predictions.

While recent research indicates that such exponential growth is unsustainable and is indeed slowing, demand for increased bandwidth will continue—albeit at a slower pace—to an annual increase of just 6% by the year 2030.⁶ At the same time, it is still too early to fully understand whether the COVID-19 pandemic will have a long-term effect on bandwidth consumption trends. For instance, will the use of applications like Zoom to facilitate two-way video communication as a replacement for in-person work and travel continue at the same level that it is employed today?

While it may not be possible to determine whether Nielsen's Law will continue to accurately predict bandwidth growth, it is undeniable that such growth will continue at some pace. Therefore, any future broadband infrastructure that is deployed must be capable of evolving to keep pace with technology and the future needs of Alaskans. When planning for broadband infrastructure, policymakers should, "throw the ball forward and work to it."

⁵ See <https://www.nngroup.com/articles/law-of-bandwidth/>

⁶ See <https://www.telecompetitor.com/bandwidth-demand-forecast-300-mbps-will-be-enough-for-most-households-to-2031/>

RECOMMENDATION #8

When developing benchmarks to assess current infrastructure or criteria to guide future expansion, policymakers should recognize that broadband service needs will continually evolve and bandwidth demand may continue to increase at a rapid pace. Policymakers should also recognize the importance of minimizing the disparity in growth between rural and urban Alaska.

2. According to research conducted by Pew Charitable Trusts,⁷ 26 states have dedicated broadband program offices, with the states of Hawaii, Michigan, Montana, Nevada, South Carolina, Tennessee, Texas, and Wyoming having added offices recently, bringing the total to at least 34. The creation of an Alaska broadband office is explored further in chapter 5 of this report. This office will be a necessary and essential component of evolving the state's broadband capabilities, and will lead coordination between policymakers, state and federal agencies, and the various broadband funding programs in order to maximize resources available to expand broadband all Alaskans.

RECOMMENDATION #9

A future Alaska broadband office must work closely with state and federal agencies and other policymakers to maximize resources available for broadband expansion in Alaska.

⁷ See <https://www.pewtrusts.org/en/research-and-analysis/articles/2021/06/28/which-states-have-dedicated-broadband-offices-task-forces-agencies-or-funds>

2. Buildout Plan

Task: Provide recommendations for a buildout plan to close remaining gaps and bring high-speed broadband to all Alaskans.

3. Evaluation of Broadband Technologies

Task: Evaluate all technologies that are used to provision broadband, identify and assess the pros and cons of each as they pertain to connecting all Alaskans with high-speed connectivity.

Some of the key characteristics that make Alaska a wonderful and unique place to work and live also make it a challenging place to deliver robust broadband connectivity—namely, the state’s mountainous, rugged terrain, geographic isolation, wide-open spaces, and beautiful, yet harsh, winter weather. Alaska’s telecommunications companies must oftentimes strike a delicate balance in selecting which technology to deploy where, taking into consideration performance, reliability, scalability, and cost. Making a wrong decision is more costly and consequential in Alaska than perhaps in any other state due to the distances that must be traversed and the capital outlay that is required.

In considering the range of technologies deployed throughout Alaska to connect end-users and networks to one another, the task force urges policymakers as well as key decisionmakers at Alaska’s telecommunications companies to prioritize the deployment of technologies, when feasible, that meet the state’s present-day objectives AND those 10 or more years from now. The task force urges the adoption of technologies that maximize throughput capacity and future scalability to meet the critical needs of healthcare (including telehealth and always-on cloud-based health monitoring technology), real-time two-way video and audio communications, immersive educational service delivery, and all types of commerce—from supporting remote-based work, to shipping and logistics, to online sales and marketing.

In this chapter, the task force explores the various technologies deployed to deliver broadband service throughout Alaska. Each technology may be useful in certain situations but cost-prohibitive or limiting in others. Context is key, as is capacity and cost.

Middle-Mile Technologies

As discussed in Chapter 1, middle-mile infrastructure, which may also be called “transport” or “backhaul,” is defined as high-capacity network infrastructure that links a network operator’s core network to its last-mile distribution network. Middle-mile infrastructure may also connect disparate networks to one another, or link a network to the nearest Internet Exchange Point (which, in the case of Alaska, is in Seattle or Portland), allowing traffic to be routed to all points globally and exchanged with other networks, including cloud and content delivery networks. Currently, four companies—GCI, Alaska Communications, MTA, and KPU Telecom—offer backhaul capacity between Alaska and the Lower 48.

There are currently three primary types of middle-mile connectivity in use today: **fiber-optic cables, microwave wireless, and geostationary satellites.** Low-Earth orbit satellites are expected to begin providing middle mile connectivity in the fourth quarter of 2021.

Middle-mile infrastructure does not serve individual homes and businesses directly, but the capacity and latency limitations of a middle-mile network will always have a limiting effect on downstream last-mile infrastructure that is connected to it. For example, every home on Saint Paul Island is connected via fiber optic cable to service provider TDX's last-mile network, but there is currently no terrestrial middle-mile connectivity to the island. Alaska Communications leases capacity on Eutelsat's 115 West B satellite to provide middle-mile connectivity linking TDX's network on the island to Alaska Communications' core network and the global internet.

Some networks operate exclusively as middle-mile providers, leasing capacity to last-mile ISPs and private network operators, such as the oil & gas companies operating on the North Slope. This is the case with companies like Quintillion, which in December 2017 completed a 1,180-mile subsea fiber middle-mile network that connects last-mile ISPs in Nome, Kotzebue, Point Hope, Wainwright, and Utqiagvik to Prudhoe Bay and down the oil pipeline to Fairbanks, with 10 terabits of system capacity over 3 fiber pair. Previously, last-mile ISPs in those coastal communities had to lease backhaul capacity over antiquated and very costly satellite connections to reach the global internet.

Another example of significant middle-mile infrastructure deployment is GCI's TERRA microwave network, which was completed in 2018. The network spans 84 villages and reaches more than 45,000 Alaskans across southwest, central, and northwest Alaska. It consists of more than 100 towers and delivers a total system capacity of 10 gigabits to those communities at significantly reduced costs as compared with satellite backhaul, which was the only option available to those villages prior TERRA's completion.

A. Fiber-Optic Cables

In general terms, fiber-optic cables consist of individual strands of glass, which may be as small as a human hair, that are wrapped in cladding encased in protective jacket. Fiber-optic cables allow for the transmission of data using rapid pulses of light that are generated by equipment installed at each end of the fiber. Fiber-optic cables offer extremely high transmissions speeds—by far the highest capacity and lowest latency of any broadband technology type, and are



*An artist's depiction of a fiber-optic cable.
Graphic designer will purchase stock image*

preferred by network operators for that reason. The exact capacity is dependent upon the lighting equipment installed and the number of fiber strands (or “fiber pair”) contained within the cable. Lighting equipment and glass technologies are evolving constantly, but it is now possible to transmit multiple terabits per second (Tbps) over a single strand of fiber. 1 Tbps is equivalent to 1,000 Gbps. The more strands a cable contains, the higher capacity of the cable. Generally, fiber-optic cables require light regeneration approximately every 60 miles. Ultra-high-capacity fiber-optic cables form the global internet backbone and are used to connect networks to one another. Fiber-optic cables offer extremely high reliability and are easy to maintain once deployed, but the cost to deploy them initially can be quite high over long distances or rugged terrain.

Pros:

- Offers the highest capacity and lowest latency of any middle-mile technology type
- Offers symmetrical speeds (downstream/upstream), enabling better real-time application performance, including high-definition two-way video communication for healthcare and education applications
- The most “future-proof” technology; 30+ year operational lifespan
- Extreme reliability and network up-time
- Scalability to upgrade capacity as lighting equipment technology improves over time
- In subsea installations, power for in-line light regeneration can be fed from one or both ends of the cable, allowing the cable to traverse thousands of miles without the need for powered equipment along the route

Cons:

- In most cases, the highest construction cost of any middle-mile technology, although when cost per Mbps is considered, fiber deployment is often less expensive than technologies with lower capacity.
- Permitting requirements may be extensive, particularly over federally protected lands or in subsea installations
- Risk of damage in subsea installations (ship anchors in coastal waters, commercial fishing) with high cost of repair and potentially long down-time

B. Microwave Wireless

Microwave wireless installations offer an alternative to fiber-optic cables where the latter is not practical or feasible due to costs, terrain, distance, or a combination of those reasons. A typical microwave wireless installation in a new area involves the construction of lattice-type tower and the installation of large

drum-like antennae that are aimed at corresponding antennae far away. Line-of-sight is typically required for microwave installations, so the positioning of the tower at the correct elevation is an important consideration to ensure that there are no obstructions between towers.

For instance, Alaska Power & Telephone's microwave network in southeast Alaska and GCI's TERRA network in southwest Alaska both

required towers to be installed at mountaintop locations in many areas. In addition to towers and antennas, remote installations where there is no power source require the installation of diesel power generation and a tank to store the diesel fuel.



AP&T microwave site at Kasaan Mountain
Photo courtesy of AP&T

Microwave wireless speeds will vary depending on the equipment installed, wireless spectrum band(s) in use, distance between towers, and environmental conditions. Typical system capacity can be in the 10 Gbps range.

Pros:

- Overall lower cost of construction over extreme distances
- Easier permitting, as compared to fiber installations
- Higher capacity than satellite
- Lower cost and latency than geostationary satellite

Cons:

- Limited capacity as compared to fiber
- Risk of damage in severe weather (due to icing)
- High operating costs (diesel refueling which must be done via helicopter in remote areas)
- Available wireless spectrum may be limited

C. Geostationary Satellites

Geostationary satellites have historically provided middle-mile links to Alaska communities where terrestrial middle-mile solutions could not reach. Geostationary satellites serve Alaska from a fixed position in space. As the earth rotates, geostationary satellites maintain the same orbital position over the earth's surface at high altitude (a distance in the range of ~22, 000 miles). The satellite essentially serves as a bridge, linking what are called "earth stations" on the ground in remote communities to purpose-built gateways on the ground that are fed by fiber-optic cable(s), enabling connectivity to the global internet. The Seward, Alaska teleport facility is an example of such a gateway, which connects satellites to fiber-optic networks operated by TelAlaska and Alaska Communications.



A satellite earth station in Dutch Harbor, AK.
Graphic designer will purchase stock image



Earth Station in Seward, Alaska
Photo courtesy of TelAlaska

Current geostationary satellites that can serve Alaska have limited capacity at a very high cost. Depending on the satellite and spectrum band in use, *total* capacity over Alaska can range from **500 Mbps to 1.5 Gbps**.

Because signals to and from geostationary satellites in high earth orbit must traverse such significant distances, those connections are inherently very high latency, regardless of throughput capacity. Two-way video communications, and real-time applications such as gaming may not operate well over connections that are served by geostationary satellite middle-mile.

Pros:

- Can serve locations that do not have access to terrestrial middle-mile infrastructure
- No permitting required, beyond what may be required for earth station/gateway construction

Cons:

- Limited throughput capacity as compared with other middle-mile technologies
- Highest cost per megabit
- Availability of leasable capacity is currently limited for Alaska
- Current satellites operate at an orbital plane that requires line-of-sight low on the horizon
- Inherent high latency makes real-time applications such as two-way video communication challenging to impossible
- Sun spot activity causes disruptions in service

D. Low-Earth Orbit Satellites

Conceptually, Low-Earth Orbit (LEO) satellites operate in much the same way as geostationary satellites, but with a few differences. LEO satellites operate at an altitude in the range of ~750 miles above the Earth's surface—making low-latency connections (~50ms or less) possible. LEO satellites are not geostationary, meaning they do not operate from a fixed position, but are rather launched as part of a constellation of hundreds (or even thousands) of satellites that are constantly in motion, forming a grid above the earth that allows for multiple satellites to be in view from any single point on the ground once sufficient orbital density is achieved.



An artist's depiction of a LEO satellite constellation
Graphic designer will purchase stock image

Several companies, most notably SpaceX Starlink, OneWeb, and Telesat, have either launched, or have announced plans to launch, LEO satellite constellations that serve Alaska.

As of May 2021, OneWeb has launched 218 of its planned 648 satellites for its initial constellation—offering up to 375 Gbps of capacity over the Arctic,

including Alaska. The company reports that it will achieve 24/7 coverage over Alaska in the 4th Quarter of 2021. OneWeb's gateway in Alaska is located at the Talkeetna Alaska Teleport. OneWeb is primarily focused on providing middle-mile connectivity to serve local ISPs, large corporations, and government entities.

SpaceX Starlink, as of September 2021, has launched more than 1,700 LEO satellites, 1,657 of which are currently operational. Unlike OneWeb, Starlink is primarily focused on providing end-user connectivity. But its robust network is capable of providing high-capacity middle-mile connectivity for local ISPs and large corporate customers as well. Starlink is also pioneering satellite-to-satellite laser communication to enable more efficient traffic routing and the need for fewer Earth gateways. Of the satellites that SpaceX has launched to-date, approximately 51 are capable of intersatellite communication.

Telesat, meanwhile, has announced plans to launch a global constellation of 298 LEO satellites that, by the 4th Quarter of 2024, will be capable of providing 320 Gbps of capacity over Alaska.

Pros:

- Higher capacity than most geostationary satellite solutions
- Low-latency solution that enables many real-time applications, including two-way video communication
- Can serve locations that do not have access to terrestrial middle-mile infrastructure
- No permitting required, beyond what may be required for earth station/gateway construction

Cons:

- Limited throughput capacity as compared with fiber; can only serve a limited set of users in an area
- Higher projected costs than fiber and microwave middle-mile solutions
- New technology with more unknowns than proven legacy technologies
- Requires clear line of sight horizon to horizon for a signal, with no trees, mountains, or buildings blocking the view

Summary: Middle-Mile Technologies

Fiber-optic cables are considered by the task force to be the "gold standard" middle-mile solution. As such, it should be deployed wherever feasible. Fiber offers unparalleled capacity and is scalable/upgradable to meet future demands. It also provides the lowest-latency connections over long distances, is the most reliable, and has the lowest operational and maintenance costs over time.

Microwave wireless is also a solid option where the costs of fiber-optic deployment are prohibitive. It can be used to extend networks beyond the reach of deployed fiber. Satellite-based solutions are options where lack of funding or technical feasibility limits the reach of fiber or microwave solutions. Satellite middle-mile solutions continue to evolve, and new technologies—particularly LEOs—may offer a competitive option to microwave wireless once LEO constellations are fully operational over Alaska.

RECOMMENDATION #10

Due to its unparalleled capacity, upgradeability, and reliability, fiber-optic cables should be deployed wherever feasible and practical to facilitate middle-mile connections.

Last-Mile Technologies

Last-mile technologies are deployed by local internet service providers (ISPs) to serve individual homes and businesses. As with middle-mile technologies, each type of last-mile technology offers benefits and drawbacks, and the context of the deployment will determine which solution is best in a given area.

Last-miles services consist primarily of four service delivery technologies: **fiber-to-the-premises (FTTP)**, **digital subscriber line (DSL)**, **coaxial cable**, and **fixed wireless**. Additionally, at least one **Low-Earth Orbit (LEO) satellite** operator—SpaceX Starlink—will begin providing last-mile services directly to end-user customers in Alaska soon.

A. Fiber-to-the-Premises (FTTP)

In much the same way that fiber-optic cables offer significant advantages as a middle-mile solution, fiber that is deployed *within* communities to individual homes and businesses (i.e., “premises”) also offers the unparalleled benefits of very high-speed connections (exceeding 1 Gbps) and reliability (this assumes, though, that the local FTTP network is connected to the global internet via a reliable, high-capacity middle-mile solution). FTTP networks are either deployed aerially (by attaching fiber-optic cables to power or telephone poles) or underground (either through installed conduit or in micro-trenches that are created by a machine that is purpose-built for burying fiber). Many telephone companies across the



A standard FTTP fiber optic cable
Graphic designer will purchase stock image

United States are gradually replacing their legacy copper telephone lines with fiber-optic cables, enabling FTTP as an internet service option for their customers. FTTP installations require the installation of a specialized modem within the customer's premises. A battery backup is typically required to keep the modem online during a power failure—an important consideration to ensure access to 911 emergency services remains available.

Pros:

- Offers the highest capacity of any last-mile solution
- Offers symmetrical speeds (downstream/upstream) that can exceed 1 Gbps, enabling better real-time application performance, including high-definition two-way video communication for healthcare and education applications
- The most “future-proof” technology that is scalable/upgradeable over time; 30+ year operational lifespan
- Extreme reliability and network up-time
- Lowest overall maintenance cost
- Can be deployed incrementally, starting with fiber-to-the-node in a given neighborhood and then eventually all the way to each premises.

Cons:

- Except in the case of entirely new builds, requires “brownfield” deployment to overbuild legacy copper infrastructure, which can be costly
- Requires battery backup systems at the customer premises to ensure the ability to dial 911 and reach emergency services in case of a power outage (legacy copper networks were powered by the lines themselves; no additional power source was required)

B. Digital Subscriber Line (DSL)

DSL is a family of technologies used to transmit data over legacy copper telephone lines. DSL is usually asymmetric, meaning that download speeds are usually significantly higher than upload speeds. DSL usually requires the installation of a modem in the customer's premises, which communicates with another piece of equipment called a digital subscriber line access multiplexer (DSLAM), typically located in the ISP's telephone exchange facility.



A standard DSL/Telephone cable with RJ11 connector
Graphic designer will purchase stock image

DSL service performance degrades as the distance between the customer's modem and the DSLAM increases, extending as much as 12,000-to-18,000 line-feet away before the service becomes unusable. With significant upgrades to copper plant and replacement of legacy systems, downstream speeds can reach as high as 200 Mbps over distances of about 1,000 line-feet using "bonding" technology that allows multiple copper pairs to be bonded together to achieve higher speeds. Upstream speeds, though, are generally limited to no more than 20 Mbps. The potential to upgrade copper plant to provide higher speeds must be measured against the long-term, higher capabilities of fiber last-mile.

Pros:

- Widely deployed today over legacy copper telephone lines; can be good interim technology until fiber-optic technology is deployed
- Bonding technology can be employed to increase copper's efficiency
- Can deliver speeds of up to 200 Mbps if copper lines are maintained and the distance between the customer and the DSLAM is shortened

Cons:

- Limited speeds in both directions, with upload speeds extremely limited
- Can be very unreliable if copper lines have not been adequately maintained over time

C. Coaxial Cable

Coaxial cable was first deployed by cable television operators as a means of delivering television services to customer homes and businesses in the 1980s and 1990s. Cable television operators gradually entered into the residential broadband business in the early 2000s as demand for internet services increased.

Coaxial cables consist of a copper wire core, wrapped in dielectric insulation and an outer metal sheath, and followed by a plastic outer jacket for protection. As in FTTP and DSL installations, a modem is required in the customer premises to connect to the cable company's network.

Cable operators have gradually upgraded their equipment to be able to deliver faster and faster speeds to end-users. Typical cable installations offer speeds in excess of 300 Mbps downstream and greater than 100 Mbps upstream. But the latest technology under ideal conditions can now achieve gigabit speeds in each direction. As with other last-mile technologies, however, coaxial cable networks are limited by the capacity delivered to a community by middle-mile networks. Local coaxial cable networks are also vulnerable to congestion and service



A standard coaxial cable
Graphic designer will
purchase stock image

degradation if shared network infrastructure in the community is oversubscribed. Coaxial cable deployments are most economically viable in communities where homes and businesses are densely located.

Pros:

- Widely deployed today in areas where home/business structure density is high
- Can deliver fast downstream speeds of up to 1 Gbps in ideal conditions, 300 Mbps to 400 Mbps under typical conditions

Cons:

- Vulnerable to network congestion when shared network infrastructure is oversubscribed
- Deployments are economically viable only in areas where structure density is high; not a solution for rural areas where homes and businesses are spread far apart

E. Fixed Wireless

Fixed Wireless is a generic term that refers to a family of wireless technologies that can deliver last-mile broadband services to homes and businesses where it is impractical or too costly to extend wireline services like FTTP, DSL, or coaxial cable.

As the name implies, a fixed wireless installation is one in which the transmitting and receiving equipment is fixed in position. Fixed wireless services can be deployed over licensed or unlicensed spectrum, and usually involve the installation of an antenna or dish upon the customer's roof, ideally in a location that gives it line-of-sight to the nearest tower.



A fixed wireless antenna attached to a customer's roof
Graphic designer will purchase stock

Speeds delivered over fixed wireless can vary greatly and are dependent upon a variety of factors, including the spectrum being used, the distance between the customer and the tower and whether line-of-sight between the antenna and tower is possible. Inclement weather can also have a negative effect upon the service, and icing of equipment is a particular concern in Alaska.

Pros:

- Can be deployed to deliver new service or replace aging copper infrastructure at a much lower cost than wireline technologies
- Can deliver speeds of up to 1 Gbps under ideal conditions
- Deployment time is typically much quicker than other last-mile solutions

Cons:

- Actual speeds and service reliability are dependent upon a variety of factors, including the type of spectrum being utilized (licensed or unlicensed), distance between the customer and tower, whether line-of-sight to the tower is achievable, and weather conditions
- Deployments using unlicensed spectrum may experience interference
- Licensed spectrum requires acquisition from the FCC or via a lease from an existing license holder

Summary: Last-Mile Technologies

As with middle-mile technologies, fiber-to-the-premises is the ideal solution for last-mile service delivery where feasible and practical, given its ability to deliver very fast, reliable service that is scalable/upgradable as technology improves and as the demand for greater bandwidth increases over time. Telephone companies will likely shift away from DSL service that is provided over legacy twisted-pair copper as maintenance and upgrade costs make the deployment of other solutions, such as FTTP or fixed wireless service, more sensible as a means of delivering higher speeds. Coaxial cable remains a fast, reliable solution for high-speed connectivity in densely populated communities. Soon, LEO satellite solutions that offer service directly to homes and businesses may also be a viable alternative as companies like SpaceX Starlink bring their systems into commercial operation.

It is important for policymakers to keep in mind that any terrestrial last-mile solution will always be limited by the middle-mile connectivity that serves it—so an equitable focus on upgrading and extending last-mile AND middle-mile technologies is important, particularly in a state like Alaska.

RECOMMENDATION #11

Policymakers should maintain a balanced focus on upgrading and extending last-mile AND middle-mile technologies, given rural Alaska's unique challenges and needs.

Appendix

The following resources should be included in the appendix:

- A. Middle mile map (source: ATA)
- B. List of public mapping resources
 - 1. NTIA National Broadband Availability Map and Indicators of Broadband Need: <https://broadbandusa.ntia.doc.gov/resources/data-and-mapping>
 - 2. FCC Fixed Broadband Deployment Map: <https://broadbandmap.fcc.gov/>
 - 3. FCC Broadband Data Collection: <https://www.fcc.gov/BroadbandData>
 - 4. USAC Connect America Fund Map: <https://data.usac.org/publicreports/caf-map/>
 - 5. OOKLA: <https://www.ookla.com/ookla-for-good/open-data#broadband-mobile-maps>
 - 6. Broadband Now: <https://broadbandnow.com/>

4. Hurdles to Investment & Deployment

Task: Assess the hurdles to broadband investment and deployment. Make recommendations on how the state can play a role to eliminate them.

Alaska's sheer size and low population density outside of its main urban areas are the most significant hurdles that challenge broadband infrastructure investment and deployment. Comprising 663,268 square miles, Alaska is larger than the states of Texas, California, and Montana combined. It is 2,261 miles wide at its broadest point (roughly the distance from New York City to Las Vegas) and 1,420 miles long from north to south (roughly the distance from Miami to Augusta, Maine). Meanwhile, according to 2020 census data, the cities of Anchorage and Juneau, along with the Matanuska-Susitna Borough and Fairbanks North Star Borough, comprise 526,238 of the state's 733,391 people (or 71.75%).⁸

The distances that must be traversed to extend broadband infrastructure, and the challenging economics of a relatively small customer base that is spread across a vast and rugged landscape make not only the initial deployment of broadband infrastructure but also the ongoing operations & maintenance of it impossible without the support of government programs. Beyond those concerns, other significant hurdles include unnecessary delays and costs associated with permitting and securing rights-of-way to extend service to new areas. The State of Alaska can take important steps to address these hurdles

Government Funding Support is Needed

A. Capital Expenditure ("Capex") Costs

Extending terrestrial middle-mile and last-mile infrastructure to new areas within Alaska requires significant capital expenditures that typically extend well beyond what could ever be recovered from future recurring customer revenue.

Depending on the technology, distance, and terrain involved, projects can range from tens of millions to hundreds of millions of dollars. When GCI built out its TERRA network in western Alaska between 2010 and 2017, total costs exceeded \$300 million⁹ to serve 45,000 Alaskans across 84 villages.

Currently, these federal agencies administer programs that provide funding for broadband-related capex costs: the Federal Communications Commission (FCC), the U.S. Department of Agriculture (USDA) Rural Utilities Service, the National Telecommunications & Information Administration (NTIA), and the U.S. Treasury's Office of Recovery Programs.

⁸ See <https://www.adn.com/alaska-news/2021/08/12/alaska-is-becoming-more-ethnically-diverse-and-less-white-census-data-indicates/>

⁹ See https://gov.alaska.gov/wp-content/uploads/sites/2/GCI-MICROWAVE_CLEAN.pdf at slide 7

The following are examples of capex costs for several recent middle-mile and last-mile projects:

Middle-Mile Project Capex Costs

- **Alaska Power & Telephone SEALink Project** (*total cost: \$21,500,000 USDA ReConnect Grant*) – The SEALink Project will create a 214-mile subsea fiber optic cable from Prince of Wales Island to Juneau, with an overland crossing on Mitkof Island through the community of Petersburg. The project also involves terrestrial network build-outs in the communities of Coffman Cove and Kasaan, which currently lack broadband service. To minimize project impacts, AP&T Wireless is constructing terrestrial features on existing utility poles and within existing ROW wherever feasible.
- **GCI Aleutians Fiber Project** (*total cost: \$58,000,000, of which \$25,000,000 is USDA ReConnect Grant*) – By late 2022, GCI will deploy an 860-mile subsea fiber system running from Kodiak to Larsen Bay, and then along the south side of the Alaska Peninsula and the Aleutian Islands to Unalaska. The project will deliver urban-level gigabit speeds, service, and reliability for the first time to the communities of Unalaska, King Cove, Sand Point, Akutan, Chignik Bay, and Larsen Bay, which had previously only been connected via geostationary satellite links.
- **Nushagak Electric & Telephone Cooperative (NETC) “Broadband for North Bristol Bay” Project** (*total cost: \$24,000,000, of which \$16,783,726 is a USDA ReConnect Grant*) – By April 2023, NETC will deploy a hybrid fiber and microwave network extending from Levelock to Aleknik, and enable 100+ Mbps broadband service in the communities of Ekwok, Aleknik, Clark’s Point, and Manokotak.

Last-Mile Project Capex Costs

- **Matanuska Telephone Association for two neighborhoods in Caswell, Alaska** (*total cost: \$2,619,173, of which \$1,964,308 is a USDA ReConnect Grant and \$654,793 are matching funds*) – The proposed project will place fiber-to-the-premises, also known as FTTP, using GPON technology to serve two neighborhoods in Caswell, Alaska. The two neighborhoods, Eagle Nest at Kashwitna and Preserve at Sheep Creek currently have no land line network. This project will build FTTP to 325 lots that currently have 203 households. Speeds of up to 1 Gbps will be available to the customers.

- **INSERT EXAMPLE FIXED WIRELESS PROJECT** (total cost: \$X,XXX,XXX) –
Insert project description

B. Operational Expenditure (“Opex”) Costs

Even when government grants are secured to cover most or all of the initial cost of construction, operations & maintenance costs can also be extreme in rural Alaska—typically requiring some combination of consistent funding through recurring customer revenue and government program support through programs such as the Universal Service Fund (USF). The state’s rural population, both in terms of low population count and low population density, combined with its often-small economic base, are significant factors affecting companies’ ability to operate and maintain broadband networks on recurring revenue alone. On top of those factors, high maintenance costs also make profitability challenging. Consider GCI’s TERRA microwave wireless network in western Alaska. Each of the network’s 100+ tower sites are powered by a diesel generator—and refueling nearly every site requires fuel to be brought in by helicopter. No other state in the country has such extreme opex costs in the delivery of broadband service.

The federal Universal Service Fund (USF) administered by the FCC through the Universal Service Administrative Company (USAC) consists of four programs, one of which is specifically tailored to supporting network operational costs in high-cost areas. The Connect America Fund – Alaska Plan, ACAM, and CAF II provide \$1.5 billion in funding over ten years and allocates that money to maintain, extend, and upgrade both fixed and mobile broadband service across remote areas of Alaska.

At the state level, AS 42.05.840 authorized the creation of an Alaska Universal Service Fund (AUSF) by the Regulatory Commission of Alaska (RCA). The fund, originally created in 1999, is “to be used to ensure the provision of long-distance telephone service at reasonable rates throughout the state and to otherwise preserve universal service.” The AUSF disbursed \$13.3 million in support to Alaska telecommunications companies in 2020.¹⁰

The following are examples of operational expenditure opex costs for several Alaska providers.

Example Opex Costs

- **EXAMPLE 1** – Insert description

¹⁰ See <http://www.ausac.org/2020%20AUSF%20Annual%20Summary.xls>

- **EXAMPLE 2 – Insert description**
- **EXAMPLE 3 – Insert description**

C. Recommendations

The task force makes the following recommendations to ensure that Alaska’s broadband providers have the necessary resources to build out infrastructure and properly maintain it over time:

RECOMMENDATION #12
Ensure the long-term stability in the Alaska Universal Service Fund.

RECOMMENDATION #13
Establish a state matching fund that can support applications to federal broadband grant programs that require a match, such as the USDA ReConnect Grant Program.

RECOMMENDATION #13
Establish a state program to help support end-user monthly costs, similar to the federal Emergency Broadband Benefit (EBB) Program.

Permitting & Rights of Way (ROW)

While there are many geographic, demographic, and economic factors that make Alaska a challenging place to deliver robust broadband services, there are also hurdles that artificially impact the costliness and expediency of construction. For instance, in even the most basic project, it can take months for broadband service providers to navigate the complicated web of federal, state, and local permitting rules to secure authorization for a project to begin. If a project traverses state and federal land, or has a subsea component to it, the permitting process is likely to extend 12 to 18 months (or even longer in some cases). For many middle-mile projects, service providers will need to assemble an entire team of consultants and attorneys to complete required environmental, historical, and cultural reviews.

Additionally, the Alaska Railroad Corporation (ARRC) has implemented a strategy to increase revenue by imposing increased fees charged to utilities to access railroad rights-of-way. ARRC maintains an exclusive “safety zone,” which is typically 200 feet wide and centered on its tracks. According to its website, the ARRC asserts the right to

“exclusive use” of the ROW for transportation, communication and transmission purposes. ARRC may, at its sole discretion, issue a permit for the crossing or use of the ROW where it is reasonable, necessary, does not affect the safe operation of trains or create any other safety hazard, and allows for future ARRC use and development. ROW and temporary construction permit applications typically require a minimum of eight weeks to review, but they can be “rushed” for an additional fee of \$10,000.

The State of Alaska can play a role in prohibiting new and increased fees and surcharges that are charged by state agencies related to broadband projects. One positive example is the Alaska Department of Transportation (DOT)’s simple, streamlined permitting structure, which is relatively quick and easy to navigate, with fees capped at \$10k per project.

But the other extreme is the Alaska Department of Natural Resources (DNR). DNR regulations set a 25% floor on revenue from space & power agreement sub-leases, with no set ceiling, instead requiring the utility and DNR to *negotiate* an agreement. This situation is creating extended project delays, and DNR regulations are being interpreted by DNR staff in increasingly expansive and intrusive ways, adding unnecessary burden on broadband service providers and their projects—projects in which both capex and opex costs are already extreme.

Finally, state officials can take an active role in supporting the work of Alaska’s congressional delegation to secure additional federal permitting relief for broadband projects. The task force would like to commend the work that U.S. Senators Lisa Murkowski and Dan Sullivan, as well as Congressman Don Young, have already done to support Alaska’s service providers and promote broadband expansion across the state.

RECOMMENDATION #14
Policymakers should take steps to reduce the lengthy and costly state permitting burden on broadband projects and eliminate or reduce fees that state agencies charge for such projects.

RECOMMENDATION #15
State officials should actively support Alaska’s federal congressional delegation in their efforts to reduce federal permitting burdens on broadband infrastructure projects.